Conversion of MDF wastes into a char with remarkable potential to remove Food Red 17 dye from aqueous effluents

M. A. Zazycki; D. Perondi; M. Godinho; M. L. S. Oliveira; G. C. Collazzo; G. L. Dotto

Abstract

Medium density fiberboard (MDF) wastes were converted into an efficient char able to uptake Food Red 17 dye (FR17) from colored effluents. The yield of the pyrolysis process, in terms of char, was 29%. The produced char presented micro and mesoporous, with surface area of 218.8 $m^2 g^{-1}$ and total pore volume of 0.122 $cm^3 g^{-1}$. Regarding to the FR17 adsorption, removal percentages of 90% were found at pH 2 and using 0.5 g L^{-1} of char. Pseudo–first and pseudo–second order models were adequate to represent the adsorption kinetic profile, being the equilibrium reached within 20 min. Freundlich model was selected to represent the equilibrium data. The maximum adsorption capacity was 210 mg g^{-1}. The adsorption of FR17 on the char was endothermic and physical in nature. The char was efficient for 8 adsorption–desorption cycles, maintaining the same adsorption capacity. In brief, this work demonstrated a useful practice in terms of cleaner production. It was possible add value to MDF wastes, generating an efficient and reusable adsorbent to treat colored effluents containing FR 17 dye.

Keywords: Adsorption, Char, MDF, Pyrolysis, Reusable adsorbent.